

LaRC-SI

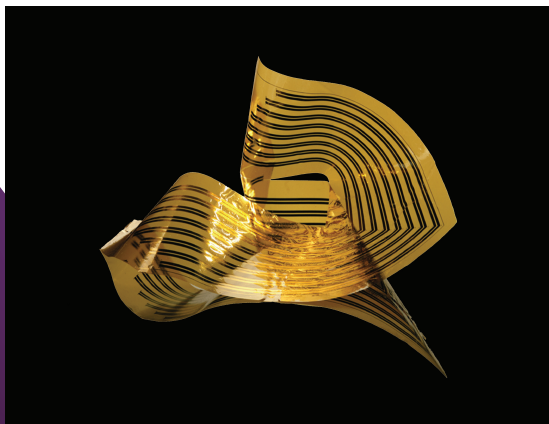
Highly flexible and durable high-temperature resins for dielectric films, coatings, composites, adhesives, and solid parts

TECHNOLOGY OPPORTUNITY

Langley Research Center (LaRC) discovered this soluble imide (SI) during an advanced aeronautics materials research program and found that this high temperature material has surprisingly good processing properties along with good machinability, solution casting, compression molding, and extrusion characteristics. LaRC-SI was quickly commercialized and has found its way into many applications, such as flexible and multilayer circuit substrates, dielectric film, wire insulation, mechanical parts, hot melt adhesive film, composites and fiber optic cladding. Because LaRC-SI is processed so easily by so many standard methods, the variety of applications that have not yet been explored far exceed those that have.

BENEFITS

- Highly flexible and durable – can be used in tight spaces
- Ease and variety of processing methods compared to other advanced polyimide materials
- Biologically inert – able to be used for medical devices, including implantables
- Recyclable unlike other advanced imides and many other intractable plastics
- Exceedingly large variety of uses because of flexibility in methods of manufacturing, resistance to chemicals, performance from cryogenic to high temperature, flammability resistance and dielectric properties, and biological inertness



COMMERCIAL APPLICATIONS

The technology offers wide-ranging market applications, including:

- High-temperature adhesives, coatings, and barriers (wire coatings)
- Matrix resin for composites (carbon fiber and glass)
- Electronic packaging components
- Optical cladding
- Dielectric coatings and films
- Structural or mechanical parts, either filled or unfilled
- Radiation shielding
- Flame-retardant foam (structural and flexible)
- Low pressure bonding for sandwich panel construction

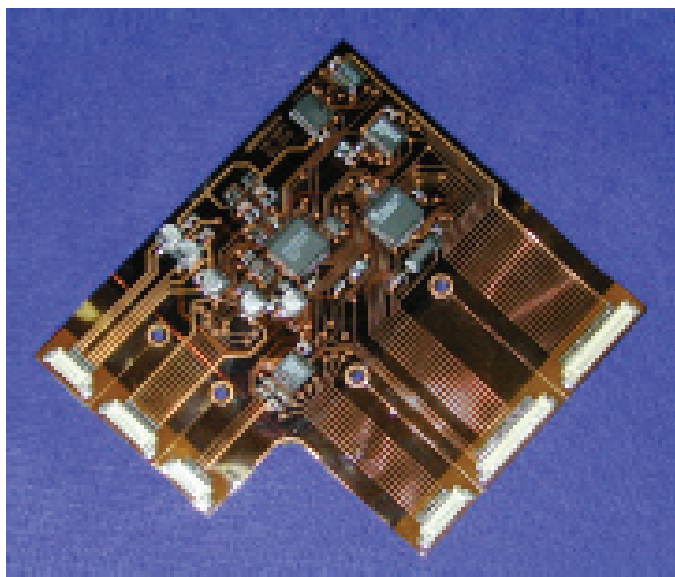
TECHNOLOGY DESCRIPTION

LaRC-SI is a wholly aromatic high-performance thermo-plastic polyimide that is a self-bonding/non-curing resin made from commercially available monomers. This polyimide has superior mechanical, electrical, and adhesive properties and an extensive range of processing choices that allow it to serve as either a dielectric inner layer, substrate coating, or the substrate. LaRC-SI film is made by casting or spraying a solution consisting of xylene, N-methyl-pyrrolidinone (NMP), and LaRC-SI powder. At different drying temperatures, various amounts of solvent are removed to the point where it becomes insoluble but retains its melt processability. LaRC-SI excels in the following characteristics:

- Solubility in conventional high-boiling solvents
- Melt flow and bonding properties
- Electrical properties – low dissipation factor and high dielectric strength
- Resistance to harsh environments such as radiation, cryogenic and elevated temperatures, most fluids, corrosives, and biological inertness



LaRC™-SI mechanical parts



3-Layer SI high speed A/D flex circuit board



PATENTS

Relevant base patents:

US Pat. 5,639,850US

Pat. 5,741,883US

Pat. 6,048,959

FOR MORE INFORMATION

If your company is interested in licensing or joint development opportunities associated with this technology, or if you would like additional information on partnering with NASA, please contact:

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